OTS: 60-41,327

JPRS: 5515

10 September 1960

Aero Mech.

SOVIET MACHINE BUILDING

No. 21 (Trans No 17, part I)

SELECTED TRANSLATIONS

Distributed by:

OFFICE OF TECHNICAL SERVICES
U. S. DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

Price: $0.50

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
205 EAST 42nd STREET, SUITE 300
NEW YORK 17, N. Y.

JPRS: 5515

CSO: 2900-N/17

SOVIET MACHINE BUILDING

No. 21

SELECTED TRANSLATIONS

Introduction

This is a serial publication containing selected translations of articles on the machine building industry in the Soviet Union. This report consists of translations on subjects listed in the table of contents below.

Table of Contents

a. D-455 Road Roller

/Following is the translation of an article by S. A. Varganov entitled "Dorozhnyy Katok D-455" (English Version above) in Mekhanizatsiya Stroitel'stva (Mechanization of Construction), No. 5, May 1960, Moscow, pages 22-24./

The Moscow Machine Plant of the MPS /Ministry of Railroads?/ has built an experimental lot of D-455 vibration rollers. The D-455 vibration roller is designed for compacting gravel, rubble, and other road bases and surfacings, and for compacting asphalt-concrete mixtures during the construction of sidewalks, park lanes, and floors of industrial buildings as well. This roller is of the self-propelled, two-axle, two-roll type, with one driving vibrating roll. The welded frame of this roller consists of two longitudinal beams connected by cross-arms. The rear cross-arm is removable, which ensures a rapid disconnection of the vibration roll. The longitudinal beams in the front part are welded to a box serving as a tank for the roll wetting fluid.....

Characteristics of the D-455 Vibration Roller

Weight	1,300 kg
Width of rolled swath	850 mm
Diameter of rolls:	
Driving vibrating roll	730 mm
Guide roll	600 mm
Width of rolls:	
Driving vibrating roll	850 mm
Guide roll	800 mm
Weight distribution between rolls:	
Driving vibrating roll	830 kg
Guide roll	470 kg
Base of roller	1,655 mm
Clearance under frame	205 mm
Traveling speed:	
First gear	1.6/km/hour
Second gear	3 km/hour
Type of vibrator -- centrifugal, with circular oscillations	
RPM of vibrator shaft	4,000
Oscillation amplitude of vibrating roll	0.6-0.7 mm

Disturbing force	2,800 kg
Engine:	
Type -- two-cylinder, four-cycle, carburetor, air-cooled	
Model --	UD-2
Maximum power	8 HP
RPM at maximum power	3,000
Dimensions: length x width x height	2,500x1,100x1,750 mm

Tests of the vibration roller were conducted under actual conditions when compacting various asphalt-concrete mixtures, including colored asphalt and gravel-rubble road bases as much as 18 cm thick.

b. Mounted Bulldozer Attachment for Road Rollers

/Following is the translation of an article by N. L. Borisov entitled "Navesnoye Bul'dozernoye Oborudovaniye k Dorozhnomu Katku" (English version above) in Mekhanizatsiya Stroitel'stva (Mechanization of Construction), No. 5, May 1960, Moscow, pages 24-25/

The workers' collective of the Specialized Board of Mechanization in the Odesskiy Sovnarkhoz has developed the design of a mounted hydraulic bulldozer attachment for the D-211 motorized road roller, with a reversing hydraulic drive. Length of blade of the bulldozer is 1,900 mm, and its height -- 600 mm.

This attachment is designed for the simultaneous conduct of the leveling and compacting of the ground base and subbase in road construction.

The upper side of the blade is hinged, through lugs welded onto its rear, to the piston of the hydraulic cylinder.

The blade is provided with a cutting edge along its entire bottom, and with side walls reducing the loss of earth during earthmoving. Ski-like bracket stops serve to adjust the cutting depth, or the thickness of the subbase when leveling.

The maximum height of ascent of the blade above the supporting surface of the roller is 200 mm; and the maximum depth of descent of the blade is 100 mm.

A road roller with an experimental model of the mounted bulldozer attachment has undergone plant tests and it has been transmitted for experimental operation on housing construction sites.

c. T-3500 Earth-Compacting Mechanical Tamper on S-80 Tractor

/Following is the translation of an article by N. S. Komarovskiy entitled "Mekhanicheskaya Trambovka T-3500 na Traktore S-80 dlya Uplotneniya Grunta" (English version above) in Mekhanizatsiya Stroitel'stva (Mechanization of Construction), No. 5, Moscow, May 1960, pages 25-26./

At present the compacting of bases under foundations, especially on macroporous soils, is conducted with tamping slabs weighing up to four tons. The slabs are dropped by an excavator from the height of five to seven meters. Inasmuch as the falling slab is not equipped with guide rods, therefore, when it falls onto the ground, pressure usually becomes irregularly distributed over the area being compacted.

The great size and limited maneuverability of 15-ton excavator-cranes (cranes with any lower lifting capacity are unsuitable) make it impossible to use them on narrow or closely bounded sites.

As for the wear of the steel cables, it is unusually extensive, even when special attachments, "vertlyaks" /swivel hooks?/, are used.

Taking into account these disadvantages of the use of excavator-cranes for earth compacting, the present writer has, jointly with Engineer I. D. Aleshin, designed the T-3500 mechanical tamper mounted on an S-80 tractor, for compacting the bases under the foundations of plant shops.

The principal units of the tamper are: guide frame, frame outriggers, tamper slab, frame crosshead with clamping attachment, bracket for attaching the frame to a tractor, Γ-shaped stand, cable gear for raising and lowering the frame crosshead, counterweight (1,200 kg), and a winch.

...On being raised to its uppermost position, the slab is automatically disconnected from the frame crosshead by means of a lever mechanism and falls freely. Thereupon, the frame crosshead, under the action of its own gravity, and when the winch brakes are released, also falls and automatically connects to the slab, which already lies on the surface of the earth being compacted. Then this cycle -- the lifting and dropping of the slab -- is repeated. The machine executes four to five slab droppings a minute.

Traveling speed of the machine is 40 meters a minute.

The mechanical tamper is manipulated from the cab of the tractor operator. One tractor operator can service the

tamper. Dimensions of tamper with tractor (length x width x height): 5,700x2,460x5,000 mm.

d. Conference on the Improvement in Design and Performance of Construction and Installation Cranes

/Following is the translation of an article by V. I. Idashkin entitled "Soveshchaniye po Uluchsheniyu Konstruktsiy i Raboty Stroitel'no-Montazhnykh Kranov" (English version above) in Gidrotekhnicheskoye Stroitel'stvo (Hydraulic Engineering Construction), No. 5, Moscow, 1960, pages 62-63./

The improvement in the mechanization of hoisting-transporting operations is a factor in the further development of the industrialization of construction. In recent years considerable accomplishments have been made in the field of the mechanization of installation operations: construction has been provided with much additional mechanical equipment, and new construction and installation cranes have been designed, including cranes with large lifting capacities (12-50 ton gantry cranes, 25-30 ton crawler and rail cranes, etc.).

The use of cranes in hydrotechnical construction is of decisive importance to the pace of conduct of concrete-laying and installation operations; thus, e.g., it is expected that for the construction of the Bratsk Hydroelectric Power Station cranes will lay over 80 percent of the needed concrete.

The proper organization of installation operations during the erection of hydraulic structures hinges on an efficient, combined utilization of general-purpose construction cranes and special-purpose cranes. However, the design of many of the cranes used does not satisfy the requirements of up-to-date construction, and the utilization of crane time and crane productivity definitely lags behind the existing possibilities.

The cranes used in hydrotechnical construction display the following design shortcomings: the 2D-6 diesels of crawler excavator-cranes are not suitable for excavator-crane work; the design of the reversing gear in E-1003, E-1004, E-1251, and E-1252 excavator-cranes fails to ensure smoothness of activation and causes a jerky performance of the cranes.

Considering that no special-purpose crawler jib cranes are being manufactured industrially, use is made of E-255, E-505, E-1003, E-1004, E-1251, E-1952, and E-1254 cranes. However, they all, except for the E-1254, do not satisfy the

requirements required for construction and installation cranes. The jib-raising winches of the excavator-cranes do not make it possible to luff the weight-carrying job (because of the unreliable design of the brake of these winches, the jib may drop even when not carrying a weight).

As a result of the shortage of crawler cranes, ESh 4/40 and SE-3 excavators are being used in the capacity of cranes (at the Kamgesstroy) /Kama River Hydroelectric Power Plant Construction Administration/. The Uralmashzavod Ural Machine Plant has designed the EKG-4 excavator crane, but the production of this crane has not yet been set up. The UBK-505, KBGS-101 and TBK-15--40 special tower cranes are not being manufactured industrially, and in this connection the Ministry of Power Station Construction has to organize their production in its own plants.

On a majority of hydrotechnical construction sites the organization of crane use is imperfect: construction schedules are irregular and too many cranes are used, the lifting capacities of cranes are insufficiently utilized, and the variety of crane types is limited.

The problems of improving the design and performance of construction and installation cranes were the object of the Special Conference convened in December 1959 by the Scientific and Technical Society of the Construction Industry, the Central Committee of Builders' Trade Unions, and the Scientific Research Institute of Organization and Mechanization of Construction and Technical Assistance. Over 300 workers from construction, design, and scientific-research organizations and crane plants from 71 cities of the country had participated in the activities of the Conference.

The Conference listened to reports by V. A. Ivanov and V. I. Polyakov on the requirements to the industry building construction and installation cranes, and the ways of improving the use of cranes in construction; A. I. Chernov on the trends in the development of tower cranes; L. N. Shchipakina and I. B. Gitman on the use of cranes in industrial construction; P. S. Neporozhnyy on the cranes for hydrotechnical construction; M. M. Sinayskiy on the electrical equipment of construction and installation cranes; S. E. Kantorer on evaluating the economic effectiveness of the use of cranes in construction; and A. A. Okorokov and Ye. F. Medvedeva on crane breakdowns and the measures for their elimination and for the improvement of the working conditions of the operators of tower cranes.

P. S. Neporozhnyy in his report pointed to the requirements required for cranes by the builders of hydrotechnical structures.

Taking under consideration the prototype of medium-

and low-pressure hydraulic structures on soft foundations (e. g., the Saratov Hydroelectric Power Station on the Volga, where plans provide for the maximum prefabricability of construction on the basis of individual reinforced-concrete components), it is necessary to design a portal-gantry crane with a lifting capacity of 75 tons. To erect hydraulic structures on stony foundations (Bratsk, Krasnoyar, Ust'-Ilim, and other hydroelectric power stations), where the application of maximum prefabricability is less easy, it is necessary to use a two-bracket crane of the hammerhead type, designed and built by the Leningrad Plant imeni S. M. Kirov, and a portal jib crane with lifting capacities of 50 and 30 tons for the two lengths of its jib, whose design has been blueprinted by the same plant. The construction of the above-named hydroelectric power stations will involve the use of prefabricated components weighing as much as 200 tons, which requires the designing of a new derrick crane. Dragline cranes, which operate very efficiently and are widely used in foreign practice, will find widespread application on hydrotechnical job sites. These cranes should be modernized by increasing their span to 1,000-1,200 m /mm/, and increasing their lifting capacity to 25-30 tons. A design of one such dragline crane has already been drafted.

The general requirements posed to the construction and installation cranes used in hydrotechnical construction provide for the necessity of increasing their lifting capacities, operating range, and speeds, and for introducing cranes guided by remote control and television as well. Also, it is necessary to design a series of small mobile and stationary cranes with low lifting capacities, for minor operations in concrete-laying units.

The Conference has adopted recommendations purporting to improve the design and performance of construction and installation cranes.

In view of the existing duplication in the research on new crane types (tower, wheeled, automobile-mounted, and crawler cranes), it was acknowledged as necessary to entrust the coordination of all this research to the main scientific research institutes -- the NIIOMPTP and the VNIIstroydormash /Scientific Research Institute of the Organization and Mechanization of Construction and Assistance at the Academy of Construction and Architecture USSR, and Scientific Research Institute of Design and Planning in the Road Machine Building Industry/--while reserving as before the designing of heavy special-purpose installation cranes with lifting capacities of over 25 tons to the design organizations of the Ministry of Power Station Construction and the Ministry of Construction RSFSR.

It is necessary to intensify the attention of the organizations designing new crane types to the problems of the standardization of units, automation of operations, and improvement in the working conditions of crane operators. To reduce crane weight, it is necessary to use special steels, light alloys (for extra long jibs), and tubular and sheet components. Major problems with regard to the improvement in crane design are confronting the scientific-research and project-design organizations. Their plans of activity should be expanded to include the drafting of technical requirements and standards for the design and production of cranes; drafting of norms and standards for the auxiliary weight-grabbing attachments for bulk loads; drafting of State standards for wheeled, automobile-mounted, crawler, and tower cranes; and research in the modern types of cables and crane drives and drafting of recommendations for their perfection. It is necessary to investigate the possibility of using polymer plastics in crane parts, and to develop a reliable design of a brake for jib cranes (in lieu of the constantly closed brake), and so forth.

In the designing of new cranes and modernization of existing ones special attention should be paid to the improvement in the design of cabs, so as to facilitate the working conditions of the operators. Having noted that the currently used limiters of the lifting capacity of cranes do not satisfy labor safety requirements, the Conference turned to the State Committee of the Council of Ministers USSR on Automation and Machine Building with the request to announce an All-Union contest for the best system of mechanism preventing crane overload.

The Conference noted that the volume of production of wheeled, automobile-mounted and crawler cranes, and of mobile five-ton tower cranes as well, is definitely insufficient, and it turned to the Gosplan USSR with the request to take measures to reduce the design periods of new jib cranes, including the cranes with lifting capacities of 30 to 100 tons. It is necessary to hasten the industrial mastering of the production of heavy crawler, wheeled and automobile-mounted cranes at the Odessa, Voronezh and Kamyshinskiy plants, and to increase greatly the output of jib cranes.

At the Conference sharp criticism was addressed toward the production base of the crane building industry. Construction and installation cranes at present are being produced by over 50 small plants, with the tower cranes alone being produced by 42 plants, and there is lack of cooperation among and specialization of these enterprises. The serial production of heavy-duty installation cranes and special-purpose cranes for depot operations has not as yet been

organized. The current practice of producing cranes in the plants of construction organizations themselves does not yield an output large enough for the needs of construction. The Conference declared itself in favor of reducing the number of the tower crane manufacturing plants; it is necessary to carry out the specialization of these plants, and their cooperation, upon a corresponding increase in their output capacities.

The Gosplan USSR and the State Committee on Automation and Machine Building should organize the production of crane accessories and attachments: hydraulic drives, control cabs with built-in equipment, turntables on ball bearings, instruments for ensuring labor safety in cranes, radio equipment, drums for reeling cable, automatic stress-control devices, anemometers, special-purpose tires for wheeled cranes, designed for considerable loads and difficult traveling conditions, and cargo and boom winches ensuring a smooth positioning of the installed building components.

It is necessary to expand substantially the variety of the electric crane equipment with, among others, an electric motor executed in flanged form with a built-in eddy-current brake, compact multiple-speed controls, magnetic units, control boards, brakes with electrohydraulic push rods, etc.

To improve crane utilization so as to increase crane productivity, it is necessary to draft: fixed standards for the assembling, dismantling and transport of construction cranes, operating modes of construction cranes, technical requirements for the design of crane runways, including the runways of precast reinforced-concrete supporting components, etc. It is necessary to draft an album of diagrams of crane operation, labor safety posters, etc.

There is a need for developing a standard technology of the capital repair of the mass types of tower cranes by, among others, the assembly-unit method. To improve crane utilization, it is necessary to organize the production of mobile stations of technical assistance and stations for crane maintenance.

It is necessary to increase the responsibility of the servicing and administrative personnel for the safe operation of cranes.

The participants at the Conference noted that such a conference, attended by a large number of workers of various branches of construction, scientific-research and design organizations, and of crane plants as well, is the first of its kind, and that it has made it possible, through the discussion of the complex whole of the problems of the designing of the production and operation of construction and instal-

lation cranes, to determine the measures necessary for improving the situation. The Conference turned to the Scientific and Technical Society of the Construction Industry with the request to convene an analogous conference once every two or three years.

Chem Mach. SMB(21) JPRS 5515 10 Sep 60

e. New Machines, Apparatuses, and Instruments

/Following is the translation of an article entitled "Novyye Mashiny, Apparaty i Pribory" (English Version above) in Mashinostroyeniye (Machine Building), No. 3, Moscow, May-June 1960, pages 43-46./

MAIN FILE

NTP-800 Centrifuge for De-Oiling Metal Chips. The Irkutsk Branch of the NIIKhIMMASh /Scientific Research Institute of the Chemical Machine Building Industry/ has drafted the technical project of an experimental model of the NTP-800 continuous-action centrifuge designed for de-oiling metal chips, and the Kurgan Chemical Machine Building Plant has drafted the related working blueprints.

The separating capacity of the new centrifuge is thrice as high as that of the intermittent-action TK-1000 analogous-purpose centrifuges, which will make it possible to reduce the residual content of oil in shavings from 2.4 to 0.5 percent. The centrifuge can be incorporated in mechanized continuous-flow lines for processing continuously chips or small parts.

The size series of the centrifuges intended for industrial production are designed for productivities of 0.75, 1.5, 3, and 5 tons/hour, respectively, commensurately with the productivity of chip-crushing equipment.

Technical Characteristics of the NTP-800 Centrifuge

Dimensions of rotor:	
diameter	800 mm
height	400 mm
Capacity of rotor	45 decimeters
Maximal Rotor Load	90 kg
Rotor RPM	1,500
Separation factor	1,000
Motor Power	4.5 kwt
Duration of:	
Start-up	2 minutes
Stopping	2 minutes
Maximal pressure of oil pump	14.5 kg/cm^2
Dimensions of machine:	
Length	1,900 mm
Width	1,825 mm
Height	1,195 mm
Productivity	1.5-2 tons/hour

Number of double piston strokes per hour	360
Piston stroke in mm	20

Filter for Molten Sulfur. The Moscow NIIKhIMMASh has developed the design of a sheet filter for operation under pressure, designed for removing mechanical impurities from molten sulfur. The content of the solid phase in the molten sulfur mass prior to its filtration amounts to 0.2-1.5 percent, whereas in the filtrate it amounts to not over 0.005 percent.

The design of the filter provides for the possibility of reducing the surface area of filtration by removing one or two filtering disks. The filtering base is constituted by a mesh No. 120/1560 of stainless steel.

Technical Characteristics of the Molten Sulfur Filter

Yield of Refined Sulfur	1,000 kg/hour
Surface area of filtration	2 m^2
Maximal filtration pressure	2 kg/cm^2
Vapor pressure in heat bag	Up to 6 kg/cm^2
Temperature of sulfur during filtration	135-150°C
Filter capacity	0.43 m^3
Dimensions:	
Length	2,915 mm
Width	1,370 mm
Height	1,865 mm
Weight (when in operation)	2,520 kg

This filter was built by the Experimental Plant of the NIIKhIMMASh.

System for Automatic Guidance of SAS Separator. The Moscow NIIKhIMMASh has developed a system for the automatic guidance of the SAS separator, acting in accordance with the turbidization of the transparent centrifugate and ensuring the automatic discharging of slime whenever the degree of clearness of the centrifugate is lower than pre-set.

The performance of the system is based on a photoelectronic turbidity regulator consisting of a photoelectronic sensor on photoresistors and a secondary instrument with index pointer and a relay at the output.

When the centrifugate becomes more turbid than is permissible, an automatic pulse actuates the closing of the gate valve and the discontinuation of the delivery of the centrifugate. The gate valve is closed by a d-c motor connected according to the EMU -- motor circuit. This is followed by the -- also automatic -- triggering of the electro-

pneumatic command instrument which conducts the discharge of slime from the separator chamber in a definite sequence of motions. This, in turn, is followed by the opening of the centrifugate delivery valve, and the process repeats itself anew.

The final adjustments of the turbidity regulator and the automatic guidance system as a whole will be conducted after the industrial tests of the separator.

SGU-1-58 Gas-Cutting Machine. The operation of the ASP serially manufactured oxygen-cutting machine has revealed the need for a further improvement of machines of this class and for the expansion of their technological possibilities. In this connection, the VNIIAvtogen /All-Union Scientific Research Institute of Oxyacetylene Cutting/ has designed the SGU-1-58 machine for separatory cutting, under stationary plant conditions of sheets up to 2,000 mm wide and 6,000 mm long of low-carbon sheet steel 5 to 300 mm thick. When it is necessary to cut still longer sheets, it will then be possible to install additional sections of the copying table and track, each of which will increase the length of the processed sheets by 3,000 mm.

...A provision has been made for the possibility of equipping the machine with a photocopying head (together with a control cabinet) for operation according to a master layout on the scale of 1:1. The installation of the photocopying head is optional and customized.

Technical Characteristics of the SGU-1-58 Machine

Type-size of machine (GOST State Standard 5614-58)	MRK-2
Dimensions of Handled Parts (width x length)	2,000x6,000 mm (and more)
Thickness of Cutting of Metal	5--300 mm
Cutting speed	50-1,500 mm/minute
Consumption of gas per cutting blowpipe:	
Oxygen	1.5-35.0 m^3/hour
Acetylene	0.2-1.4 m^3/hour
Working pressure of gases:	
Oxygen	Up to 10.0 kg/cm^2
Acetylene	Not less than 100 mm water column
Number of cutting blowpipes	4
Power supply source	three-phase a-c system, 220-volt
Power consumption	0.5 kwt
Size of machine	7,603x4,830x2,000 mm

Weight:

Total	1,670 kg
Undercarriage alone	365 kg

The Avtogenmash Plant in Odessa has initiated the serial production of the SGU machines.

END